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A Study on the Quality Management of Containerised Grains in Asia*

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ABSTRACT

To make the best use of the imbalance of container flows between Asia and North America, containers are employed to carry grain cargoes from North America to Asia. Three criteria and nine sub-criteria were used to help control the quality of the grain cargoes shipped in containers. AHP technique is employed through a survey to major containerised grain cargo shippers, consignees, and ocean carriers to measure the degree of importance of the determinants influencing the quality of grains transported by containers. Without appropriate facilities and strategies, containerised grains mildewed easily during ocean voyage. Researching findings provide strategies to effectively reduce the damage rate of containerized grains cargo and improve the quality of the origin of food supply chain.

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1. Introduction

As the amount of agricultural land is too small to support mass production of grains in Taiwan, most of grains consumed locally are imported from abroad by dry bulk ships. In general, Taiwan imports about 7 million tons of wheat, maize, and soybean annually (see Table 1 and Figure 1).

As the traffic flows between Asia, Europe, and North America are not balanced, it is found more than double the amount of containers exported from Asia to North America than from North America to Asia (see Figure 2). In the mid-2000s, containerised grain shipping became popular, as shippers found it was cheaper to move grain cargoes by containers than to

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move these cargoes by dry bulker ships.

Thus, the container ship owners and grain cargo shippers started to heavily use dry containers to move grain cargoes from North America to Asia during the 2005-2007 high freight period (see Figure 3). Even after the dry bulk shipping freight rate became cheap, some grain shippers have continued using the containers to move their dry grain cargoes for several reasons: (1) The demand for qualified food grains and feed grains is increasing. If the origin of the imported grains is different, it will not be possible to load these two different grain cargoes into the same cargo hold of a dry bulk ship to avoid mixing different grades of the grain cargoes (OTA, 1989). (2) the increasing demand for small-sized grains cargoes trade is related to the on-going popularity of small and medium grain trading houses (Mrema, 2011; Frittelli, 2005). (3) the containerised grain trade can help grain importers to improve the health of their cash flow. A forty-foot equivalent container accommodates around 26 metric tonnes, while a twenty-foot equivalent container can carry about 21.5 metric tonnes. Compared to a cargo hold of around 10,000 metric tons loading capacity in a traditional Panamax dry bulk ship, the amount of cash required for a small grain cargo importer is minimal when using containers (Prentice et al., 2002); and (4) the economic aspect derives from the fact that most cereal grains are grown and harvested in large quantities. To avoid the oversupply of grains damaging the price in a certain market, sufficient capacity of grain siloes is regarded as necessary to wait for the grain price to become stable again. According to Kosior et al. (2002), the grain ocean freight difference between container shipping and dry bulk shipping will be minimized when the amount of cargoes lifted is around 10,000 metric tonnes (Kosior, 2002).

However, as the dry container originally was designed to move general dry cargoes, using dry containers to move grain cargoes might result in a high percentage of grain cargo damage during ocean transit from North America to Asia.

Table1

Containerisation Ratio of Imported Major Grains in Taiwan (2012~2015)

Year	2012			2013			2014			2015		
Grains	Imported by containers	Total Imported	Containerisation Ratio	Imported by containers	Total Imported	Containerisation Ratio	Imported by containers	Total Imported	Containerisation Ratio	Imported by containers	Total Imported	Containerisation Ratio
Wheat	436,965	1,361,543	32%	288,025	1,310,059	22%	325,630	1,293,375	25%	312,314	1,332,484	23%
Maize	932,348	4,198,682	22%	793,646	3,969,387	20%	607,491	4,009,796	15%	90,935	3,758,539	2%
Soy Bean	875,368	2,344,491	37%	1,011,921	2,110,568	48%	1,169,532	2,369,346	49%	792,109	2,644,681	30%

Source: Compiled by this research with data provided by Far Eastern Silo and Shipping Corp

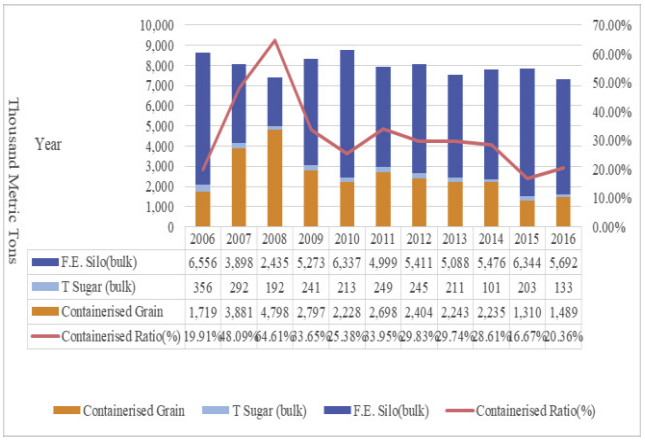

Fig.1. Amount and percentage of three major imported grain cargoes in Taiwan

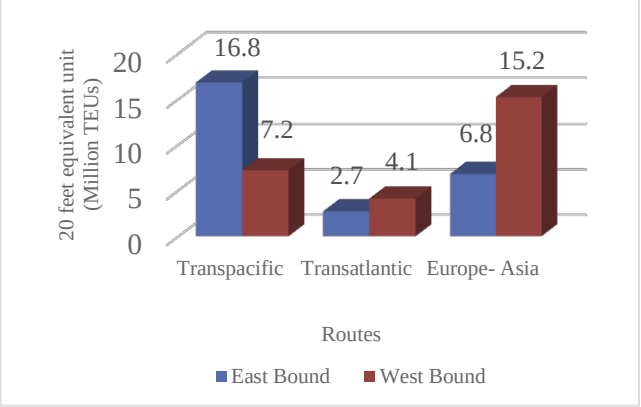

Fig.2. Containers trade imbalance between Asia, Europe, and North America (UNCTAD, 2016)

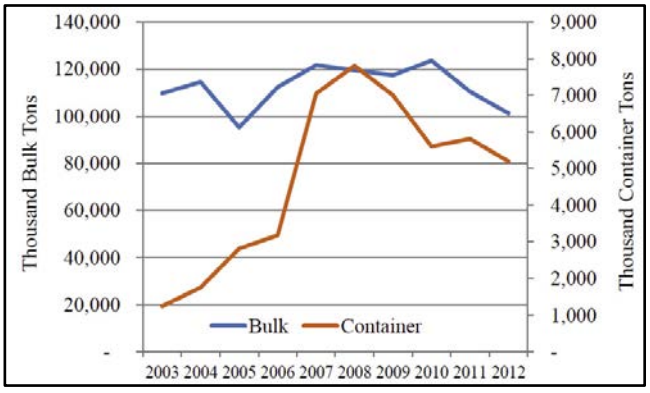

Fig.3. The amount of grains exported by bulk ship and containers in the U.S.A.

Source: Vachal(2014)

2. Grain Growth, Trading, and Transportation

According to FAO (2016), grains include wheat, coarse grains, and rice. Coarse grains include maize, barley, sorghum, millet, rye, and oats, whereas soybean is classified as an oil seed by FAO. The global coarse grain production is 1.3 billion metric tons, while the total amount of global grain trading is around 180 million tons. The major grain importing and exporting nations are summarized in Table 2.

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